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MINISTRY OF WORKS

SURVEY OF PROBLEMS BEFORE THE CONSTRUCTION INDUSTRIES

Report prepared for the Minister of Works by
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I

The Scope and Purpose of the Enquiry

1. In the autumn of 1961 I was asked to undertake a quick survey of the construction industries with the object of focussing attention on those problems which are most significant for increased efficiency. I was not given formal terms of reference but the Minister of Works wrote to a number of organisations explaining the nature of the enquiry. I attach in Appendix I a copy of his letter and in Appendix II a list of the Government Departments and organisations which I have consulted; the list includes those organisations to which the Minister wrote. In addition I have had talks with individuals in various branches of the industry and with some building owners. I have not concerned myself with direct labour schemes of local authorities, or with programmes overseas.

2. I have proceeded on an informal basis, partly because this seemed the best way of encouraging free expression of opinion and partly because of the time factor. I made it clear that I was completely independent and that matters could be discussed in confidence. Throughout the investigation I have had the warm co-operation of everyone. Unfortunately time has not allowed me to see more than a few of those in the industry and the professions whose opinion and advice I should value.

3. I believe that the enquiry has encouraged and stimulated discussion within and between the various organisations. The problems are well known within the industries. There is no easy solution to any of them, but there are signs of a new readiness to tackle them. It would be quite wrong to regard the industries as " a stagnant society "; in every section there are leaders bringing new ideas and enthusiasm. Perhaps for that reason alone the time for a survey was well chosen.

4. Because this study is intended to detect signs of ill-health it may give a false picture. I must, therefore, emphasise most strongly that in a more balanced survey I should wish to pay tribute to the remarkable recovery of the building materials industries and the construction industries from the war period when they were practically closed down; their flexibility in meeting new demands on their services in the past fifteen years; the introduction of new materials, increased mechanisation and new techniques; the steady rise in output, and the avoidance of major industrial disputes. Although, as in other industries, there are obstacles to progress, the construction industries as a whole provide an efficient service, and they do not make enough of their own achievements. Many of the difficulties from which they suffer are not of their own making. The industries are, however, much in the public eye and their deficiencies are more readily seen than those of manufacturing industries.

5. There is no statistical measurement of efficiency in the construction industries as a whole. The quarterly statements issued by the Ministry of Works are based on the value of work done in a given period and the calculations include every type of work from repairs and maintenance to large scale civil engineering construction. They are a useful guide to trends in the volume of work done, but it would be wrong to regard them as an index of efficiency.

6. I have therefore been constrained to examine the position qualitatively and on broad lines. In a quick survey of this kind it would be impossible to explore all sections of a process which involves nearly fifty building materials industries, a complex system of distribution of supplies, several professions, and a vast range of enterprises from those employing more than five thousand workers to one-man firms. Nevertheless, the organisations representing these interests have had the opportunity to express their views, and a more protracted enquiry is not likely to reveal either further problems or hidden solutions.

II

Confidence and Continuity

7. All sections of the construction industries—building materials, merchants, the professions, contractors, specialists, and operatives—feel the need for greater confidence in their own future and urge the importance of continuity of employment for full efficiency. By and large they do not create the demand for their services. The demands on their capacity are governed by the general level of economic activity and by Government policy in relation to the social services and to capital investment. No industry can be fully efficient when there are alternating spells of overloading and under-employment, but the view is held in all sections that the construction industries have suffered more than others because successive Governments have used them as a convenient instrument for regulating the economy and will do so again.

8. In periods of expansion the industries have tended to become overloaded. During periods of restraint they have had the fear that the Government will wait for statistical proof of spare capacity before releasing demand. In fact, an analysis over a period of years shows that the main effect of changes in Government economic policy has been on the housing programme and that private house building has tended to offset curbs in the public sector. Statistical exercises based on the overall picture are, however, of little comfort to the firm which has lost business, and changes within the same total capital investment programme, e.g. a switch from industrial building to roads, may have far reaching effects.

9. There is real substance in the view that greater efficiency will result if the Government can adopt as a main feature in its policies a steady and expanding construction programme for some years ahead, to keep pace with a steady rate of growth in the economy as a whole. Some of the building materials industries, particularly cement, are more efficient if they are run at full capacity. The professions are equally responsive to continuity in the demand for their services.

10. This need for confidence extends from the board room to the site. Where there is lack of confidence firms are reluctant to commit themselves to expenditure on new plant and equipment and the newer techniques are not adopted. The larger firms may have the resources and initiative to take risks; the medium and smaller sized firms who make up so much of the contracting industries need confidence if they are to expand. Confidence also influences recruitment from the operatives through to the management. All agree that confidence is needed if the quality of manpower is to be improved.

11. Greater confidence and continuity of employment will be encouraged by recent developments. The Government have recommended local authorities to plan ahead, and national programmes for roads, hospitals, universities, schools etc. are being formulated over a longer period. The new National Economic Development Council will no doubt recognise how important it is for the construction industries to have a continuing programme and a consistent policy. It must give great satisfaction to the construction industries as a whole that one member of the new Council is the head of one of its most progressive firms.

12. The National Federation of Building Trades Employers has taken the initiative in proposing a national council for the construction industries on which all sections can be represented. Such a body will keep watch on the effect of changing conditions on different sections of the industries and will be able to advise the National Economic Development Council on their capacity to meet approved programmes and possibly to have a voice in preparing those programmes. This new body must not usurp the functions of the consultative machinery of the Ministry of Works and I have suggested elsewhere ways in which that machinery can be used to better advantage.

III

Building materials—Supply and Distribution

Supply

13. I have had discussions with the National Council of Building Materials Producers, which represents over forty associations concerned with the production of materials and components for the construction industry. I have had separate discussions with the cement industry and the clay industries. I have not been in touch with several associations which are not in membership of the Council although they are important producers of essential materials.

14. The National Council consulted their member associations on certain aspects of my enquiry and I have submitted separately to the Minister of Works a summary of the replies to a questionnaire issued by them. The Council consider that, for most building materials, manufacturing capacity is adequate to meet an expanding programme, and additional capacity is being brought steadily into operation. Any shortages which may occur are localised and are soon remedied. The producers have suffered severely from changes in capital investment policy, and the extractive industries are concerned at the difficulties and delays experienced in obtaining planning approvals for new enterprise.

15. In general the building materials industries have not found it possible to conform to the policy of fixed prices for a period ahead to assist in the general adoption of firm price tendering in the construction industry. This reluctance is largely due to uncertainties about price changes in transport, fuel, steel and those raw materials which are dependent on world prices. They are also critical of a policy which they feel might result in inflated prices to cover possible changes in costs.

16. The National Council is fully alive to the importance of economic planning and it already provides a valuable forecasting service to its members.

The Council is ready to extend consultation to all sections of the construction industries and would welcome stronger support from the Ministry of Works in dealing with some of its problems.

Distribution

17. The system of distribution of building materials was examined in 1948 by an independent Committee. The system covers nearly 4,000 wholesale merchants and some 5,300 retail establishments. All agree that the services they provide are efficient and I have not found it necessary to examine them in detail. Here again I have submitted separately to the Minister of Works the results of an enquiry made on my behalf by the National Federation of Builders' and Plumbers' Merchants.

IV

Building Operations and Civil Engineering

18. The total amount of building and civil engineering work carried out in the twelve months ended September, 1961 was about £2,790m. (at current prices) of which about £840m. was repair and maintenance. Of the £1,950m. new work undertaken, 44 per cent was for public authorities including central and local government and the nationalised industries. The remainder was for private owners. The work can be classified broadly as follows:

	Per cent
1. New houses for:	
(i) local authorities, etc.	15
(ii) private owners	22
2. Other new work for:	
(i) public authorities	29
(ii) private owners:	
(*a*) industrial building	20
(*b*) miscellaneous	14

19. There are statistics galore showing the layout of the industries, and I select only two tables to illustrate the way in which the labour force is distributed. The table in Appendix III shows that during a period of eleven years there was little change in the size of the labour force, but there has been a considerable shift from repair and maintenance to new work, and a movement from the small firms to the larger units. Nevertheless, in 1960 nearly one third of the operatives were engaged on repair and maintenance, the majority of whom were employed by firms with less than a hundred employees. On new work more than half were employed by medium sized firms employing between twenty and five hundred operatives. The number employed by firms with more than one thousand operatives had increased by about forty per cent—from 98,000 in 1949 to 137,000 in 1960.

The second table, in Appendix IV, shows the percentage distribution of operatives amongst firms of various sizes, distinguishing between craftsmen and other occupations.

20. The comments in this report relate mainly to the small and medium sized firms engaged on new work. This does not mean that all small and medium sized firms are inefficient. Small firms engaged mainly on repairs and maintenance may not be highly efficient, but they serve local needs and in most cases larger firms could not undertake the work at less cost because of their higher overheads. At the other end of the scale large firms employing several thousand operatives are highly competitive, and inefficiency which shows itself in lost contracts soon finds its own remedy.

21. Although building and civil engineering are integrated for statistical purposes there are real differences between them, and it would not be to the advantage of either if they were to be treated as one entity. Building is essentially an assembly industry which is undergoing rapid changes with the development of prefabrication and new techniques of construction. Civil engineering contractors are engaged for the most part on large scale projects, usually with less intricate problems of organisation. There is naturally a good deal of common ground, but it is important that the interests and needs of the building industry should be clearly identified and not confused with those of the civil engineering industry.

22. In my discussions there has been a ready acceptance of the need to remedy deficiencies. The criticisms are directed mainly at out-of-date procedures, and the lack of cohesion between the various parties involved in building operations. Skill and enterprise are not lacking, but they need to be free to operate under efficient management. The main criticisms are:

(1) The growing shortage and high cost of land for building.

(2) Planning procedures cause delay and frustration and increase costs.

(3) Bye laws are irrational, restrictive and diverse.

(4) More standardisation is needed, to lower the expense of maintaining large stocks, to ensure sound quality and design, and to reduce costs generally.

(5) There is inadequate preparation of plans before going to tender.

(6) Many of the procedures can be simplified, e.g. greater use of standard drawings, less complicated bills of quantities, a new form of contract.

(7) The principles of selective tendering and of firm price contracts are still disregarded.

(8) There is a lack of cohesion between the architect, other professions, the contractor and sub-contractor.

(9) Site management must be improved.

(10) The building industry suffers from insufficient capital and low profit margins.

(11) There is excessive reliance on credit in various forms and on retention money.

(12) Closer co-operation is needed between the industry and research stations.

(13) More research should be undertaken into building economics, practical problems and human relations.

23. Some of these criticisms are all too familiar. They have appeared in one report after another. In some cases there are committees still deliberating, but too much time is spent on finding the perfect system while old methods persist, and a sense of urgency is lacking. Perhaps with a stronger interest from the building owner, who has to pay in the end, progress would be quicker. What is made clear is that if efficiency is to be increased, procedures and relationships must be improved and these matters must be tackled more firmly.

V

Relations between the Building Owner, the Professions and the Contractor

24. In the complexities of building operations efficiency depends on a clearly understood division of responsibility between the various partners, on the adequacy in numbers and in quality of the professions, managers and supervisors, and on the quality of their relationships. Also more consideration needs to be given to the interests of the building owner. In the private sector a client is largely dependent on the advice and guidance given by the architect with his professional associates and usually the building owner has no experience to go on in realising, for example, what can be gained by having full detailed plans prepared before work begins, or at what cost he will embark on variations from the approved scheme. The quality of work in the private sector will be influenced by the standards and discipline set by the architect. Nearly 20,000 architects practise in this country of whom about one half are engaged in about 3,000 separate private practices. About three quarters of these private practices have less than six staff. Government Departments, local authorities and other public bodies employ the balance.

25. It seems probable that the building programme for a long time ahead will continue to be a mixture of public and private investment and that public work will be put out to the private practitioner as it is at present. The fact must be recognised that the private architect operating in many small units does not meet modern requirements in such matters as organising ability, cost control and office management. More business-like methods are needed to meet the challenge from the comprehensive design and building service offered by many building contractors. Improvements could be made if private practitioners engaged in similar practices were to join forces, sharing experience as well as overheads. Also a way must be found of establishing closer contacts with other members of the building team, including the contractors, and overcoming the barriers imposed by the system of tendering.

26. The R.I.B.A. is aware of the need for change and is actively engaged in studying ways of increasing the efficiency of the private architect. This cannot be left only to new educational standards and something must be done quickly to improve organisation and methods. Fortunately, with the help of a grant from the Leverhulme Trust, the R.I.B.A. has been able to arrange a survey of the organisation, staffing and costs of architects' offices. This is the most important step taken by the R.I.B.A. for many years and the survey is likely

to reveal the urgent need for better organisation, more training in management and better communications between architect, engineer and builder. Already the R.I.B.A. is considering such matters as:

(1) A comprehensive guide to management.

(2) Standard forms aimed at simplified procedures.

(3) Uniform methods of costing and budgetary control.

(4) Interchange of information on design data.

(5) More courses of instruction in cost control and cost planning.

(6) Regular contact with groups of manufacturers on design and standardisation of materials.

(7) A code or guide to building laws.

(8) Higher educational standards and architectural education.

In general the R.I.B.A. now recognises that it must act as a co-ordinating body in the interests of the efficiency of the profession and in the public interest. Developments on these lines may have a far-reaching effect on the efficiency of architects in the public as well as the private sector and they deserve every support which Government Departments can give.

27. There is a good deal of criticism of lack of cohesion between the architect and his professional colleagues and the builder. The problem does not seem to arise in the civil engineering industry where there is close personal contact between the civil engineer and the contractor. In building there is all too often a lack of confidence between architect and builder amounting at its worst to distrust and mutual recrimination. Even at their best, relations are affected by an aloofness which cannot make for efficiency, and the building owner suffers. In no other important industry is the responsibility for design so far removed from the responsibility for production.

28. This lack of cohesion is aggravated by the methods of training and the codes of conduct for members of the professional bodies. In the civil engineering profession there is a scheme for the practical training of young engineers administered jointly by the Institution of Civil Engineers and the Federation of Civil Engineering Contractors. In the building industry builders and architects are trained quite separately. In 1950 the Building Working Party recommended that those entering the building industry as architects or managers should take a common course of study for an initial period. This has not been acted upon owing to lack of agreement, although in January, 1956, a special conference on training for the building industry—held at the R.I.B.A.—resolved that "the industry could improve its standards and raise its productivity by inter-relating the training of its constituent administrative branches". This conference led to a scheme for a staff college of advanced building technology in London which was intended in the first instance to serve the contracting side of the industry. This scheme has hung fire, but a committee under the chairmanship of Sir Noel Hall, and representing architects, surveyors, builders and structural engineers, was recently appointed to consider the subject of joint education. Meanwhile the R.I.B.A. is considering whether greater emphasis can be placed on practical training.

29. Another factor which must influence relations in the building industry is the restrictions imposed on architects and surveyors in their freedom of movement

if they are not to lose their professional status. In their 1950 report the Working Party drew attention to the differences in the codes of professional conduct of architects, surveyors and engineers:

> " A member of the Institution of Civil Engineers may engage in the contractual side of civil engineering work without resigning his membership of the Institution; a member of the R.I.B.A. may not, unless he serves on a salaried basis. A registered architect is similarly prevented from acting in a managerial capacity by the code of professional conduct of the Architects Registration Council ". The restriction of the Royal Institution of Chartered Surveyors is even more severe.

The Working Party recognised that the object of the restrictions is to safeguard the independent status of the architect and chartered surveyor but they called attention to the advantages of closer contacts within the industry. Those advantages are self-evident in civil engineering. If the architects and surveyors wish to retain these restrictions on freedom of movement some alternative way must be found of bringing about closer contacts between builders and their professional associates.

30. Excellent work has in fact been done by the National Joint Consultative Committee of the R.I.B.A., R.I.C.S. and N.F.B.T.E. since its appointment in 1955, in the examination of problems affecting architects, surveyors and builders. The Committee might usefully consider how to secure better co-ordination and cohesion between the architect, surveyor, and the various consultants now brought into the design stage, and between the professions and the contractor and sub-contractor. I suggest that the Minister of Works should ask the Committee to make a report in time for their conclusions to be placed before the committee on the placing and management of contracts which I recommend in paragraph 39.

VI

The Placing and Management of Contracts

31. The contract arrangements in the construction industries were last reviewed comprehensively in 1944 when a committee, generally known as the Simon Committee, reported the results of a two-year survey of the subject. Their recommendations as to what constituted good practice were supported by the 1950 Working Party, and by the Anglo-American Productivity Team.

32. In 1952 the Minister of Works invited the R.I.B.A. to take a lead in reducing costs and reviewing contract arrangements. This resulted in an enquiry by a joint committee of the R.I.B.A., R.I.C.S., and N.F.B.T.E. The joint committee (under the chairmanship of Sir Howard Robertson) confined its consideration to tendering procedure and reported in March, 1954, on this subject. The committee were not able to obtain the co-operation of all local authority associations in their deliberations and the local authorities were not represented on the committee. In general the committee agreed with the Simon Report and recommended, *inter alia*, the universal adoption of selective tendering and the return to fixed price contracts. Later, in September, 1959, a code of procedure for selective tendering was issued by the National Joint Consultative Committee.

33. In April, 1957, the Minister of Works announced the return to firm price tendering for Government work, subject to two conditions, one that the work was thoroughly planned in advance, and the other that the estimated contract period should not be more than two years. Firm price tendering calls for a high standard of efficiency and, in spite of some difficulties and tensions, the method has been successful where the prescribed conditions have been observed. Unhappily the lead given by the Minister of Works has not been followed by all building owners in the public sector.

34. Notwithstanding reports of committees there is still a failure to adopt procedures which were designed to secure for the building owner the full economies of effective competition between firms of similar standing. Open tendering is still common, although this prejudices the firm which maintains a high standard of work, and the building owner does not necessarily get the best value from the lowest tenderer.

35. There have been other developments which emphasise the importance of this subject. The Simon and the Howard Robertson Committees both recommended that the main contractor should be in full control of all sub-contracts and should be enabled to plan the whole of the work, though it was recognised that some highly specialised processes can best be done by sub-contractors nominated by the architect. It is the policy of the Government contracting departments to reduce as far as practicable prime cost items in the main building contract, leaving the main contractor to select his own specialists. In the case of other building owners an increasingly high proportion of work is now put in the hands of nominated sub-contractors, and main contractors may find themselves responsible for less than half the total job.

36. In March, 1961, the London Master Builders Association and the Federation of Associations of Specialists and Sub-Contractors made a study of the methods of co-ordination between main and sub-contractors. The conclusions were published but they have not yet been fully embodied in practice.

37. Another new development is the growth of the " package deal " whereby a building organisation undertakes direct with a client to provide a building to suit his needs. The main contractor employs his own professional staff and chooses his sub-contractors and suppliers. Also he can arrange the detailed design of the building to take full advantage of his own plant and techniques. The quality of design may suffer, but it is claimed that this method enables the builder to plan and execute the building operation throughout with greater efficiency and at lower cost and there may well be advantages to the building owner.

38. There are other forms of placing and managing contracts which have come into use to meet changing needs—such as the serial contract whereby tenders are invited for one job with the intention of engaging the selected contractor for successive jobs in a continuing programme. These developments reflect the need, particularly in large contracts, for early collaboration between the designer and the contractor and sub-contractor, roughly from the time when working drawings are begun. The contractor should be able to make his contribution to the plans, using his practical knowledge of building construction and new techniques, while at the same time the client should not lose the advantages of competition

based on selective tendering. Government Departments, local authorities, and other public bodies must be in a position to withstand criticism in the selection of a contractor and they are bound to exercise caution in any general departure from standard practice. There is, however, a strong body of opinion that the principles laid down ten or twenty years ago are no longer valid.

39. All these important issues need to be examined by an authoritative body of high standing, and I suggest that a Government committee should be appointed, with an independent Chairman, to make a thorough study of the placing and management of contracts in the light of modern conditions. The committee should include representatives of the building industry and the associated professions, and it is important that the co-operation of local authorities should be secured. But the committee should be smaller in size than the Simon Committee which had 41 members.

40. As in the case of the Simon Committee the committee should bring under review the whole procedure of building operations, including the method of financing. The question of retention monies was examined by a working party of officials in 1952 but there are still serious complaints about the operation of the system. The time is now opportune to consider whether the whole system of retention monies is beneficial. The committee should review the experience of firm price tendering up to date. Also the committee should consider, in the light of experience over the past twenty years, the possibility of adopting a common form of contract for both building and civil engineering work, whether for private or Government account, and standard forms of sub-contract. For many years the Federation of Associations of Specialists and Sub-Contractors has tried to secure standardisation of forms for sub-contracts. The R.I.B.A. has recently decided to hold its own enquiry into the various contractual procedures now being followed. The R.I.B.A. should be assisted in its enquiry, which is mainly for the purpose of ascertaining the facts: the results should be very valuable for the work of a Government committee. The committee might also consider how agreement on principles can be translated into practice, at least in the public sector, so that its conclusions are not ignored. Experience shows that exhortation is not enough.

41. I recommend below a separate enquiry into Scottish practice. The findings of the Scottish enquiry could be placed before the main committee which will cover the whole field. It would no doubt be an advantage if the chairman could participate in the main enquiry.

VII

Scotland

42. There are significant differences between Scotland and England and Wales as regards conditions, organisation and practices. Although there have been large civil engineering projects, particularly for hydro-electric work and three new towns, Scotland has not experienced the stimulus of a rapidly expanding building programme. There has been no surge in private enterprise housing, or in new office developments. Consequently the employed labour

force in Scotland has remained practically static, and the percentage rate of unemployment in the industries in Scotland has in the last ten years been about double that in England and Wales.

43. Another factor which can affect conditions in Scotland is the supply of building materials. Most building components come from across the Border, and both distributors and contractors complain of delays. This seems to apply particularly to household fitments and ironmongery coming from the Midlands. Without more detailed enquiry it is not possible to say where the fault lies.

44. In place of a single main contract, with sub-contracts, the normal practice in Scotland has been to let out the job in a number of contracts to separate trades. There is then no main contractor to co-ordinate the work and building owners have to rely on the architect to do so, although he receives no extra fee for this task. This can result in substantial delays and increased costs due to inadequate preparation before the job starts, and lack of continuity between trades. The system is said to be giving way gradually to the English practice, particularly with the growing complexity of modern buildings. There are, however, few firms experienced in acting as main contractors and the separate trades contract is still prevalent. It is probably the most important single factor affecting the efficiency of building work in Scotland.

45. Another practice generally adopted in Scotland which calls for examination is the settlement of contracts by re-measurement of the work when the job is finished, irrespective of the accuracy of the original bill of quantities. This give no encouragement to architects to pre-plan their work, and the building owner pays both for a full bill of quantities and for full re-measurement. In present-day circumstances re-measurement is not needed, provided the original bill of quantities represents accurately what is to be built. For many years the Ministry of Works has been trying to settle final accounts by adjustment of variations only, but the contractors are accustomed to re-measurement. When each contractor is interested only in his own trade an item which would be of little account to a main contractor engaged for the job as a whole becomes of importance to the small specialist. The re-measurement of all work by a contractor must add greatly to the cost of the operations, as well as delaying the final settlement of accounts. Local authorities and other bodies in the public sector could help in a reform of the system if they would follow the lead of the Ministry of Works.

46. Much time has been spent during the past eight years in revising the Scottish Mode of Measurement trade by trade through a joint standing committee of architects, surveyors and building contractors in Scotland. This system is not suitable for main contracting and urgent steps are needed to simplify it, as far too much time is now taken up in trivialities.

47. There seems to be a strong case too for considering whether, in Scotland, builders and quantity surveyors should be trained in a method of measurement different from that in use elsewhere. Builders and quantity surveyors trained solely in the Scottish tradition must find themselves at a disadvantage in competing for jobs in England and abroad. If Scotland is not to be left behind some unification is essential. The ideal would be one system, taking the best of each as they exist at present.

48. It appears that the problem of retention monies is even more acute in Scotland than in England and Wales, both for distributors and contractors, and the trouble probably goes deeper than practice and procedure. Most firms have limited financial resources and they have to rely on borrowing, obtaining the materials and services of sub-contractors on credit. Payment for materials and services is often delayed until the last moment and the cost of both must necessarily be inflated. The contractors carry a heavy burden, waiting for monies due to them and this acts as a brake on mechanisation. Nevertheless the builders themselves are extremely lethargic in presenting their final accounts, and even when they have done so they hold up the settlement over minor details. More information is needed before any conclusion can be reached but clearly the present position is unsatisfactory.

49. Scottish building contractors lay great emphasis on the selection of firms competent to carry out particular jobs when tenders are invited, the appointment of an architect who is ready to take advantage of changing techniques and new processes, and the establishment of full liaison between the architect and the contractor at the earliest stage. According to them:

> "Adequate pre-planning is essential and this is not generally being provided. If the architect is to be acknowledged as the supreme authority on the job, he must act as such and assume and discharge his prime responsibility".

It is possible that both the building contractors and the professions in Scotland could make a more effective contribution to the solution of these problems if the Scottish organisations had closer contacts with the central bodies in London.

50. The building industry in Scotland will have to meet an expanding programme, in housing, education, health and other public services. It must also play an effective part in the expanding economy of the country as a whole. In view of the special features of the Scottish scene I recommend that a working party should be appointed in Scotland, in consultation with the local authority associations and Scottish organisations in the industry, with an independent Chairman and assessors drawn from the various Government Departments concerned with the Scottish building programme. If such a working party is appointed it should be asked to make a report quickly.

VIII

Apprenticeship and Training

51. In the long term nothing is more important for the construction industries, including the professions, than the quality of personnel, their education and training for skill, in all its forms and at all levels, and the relations between them. I will not attempt to deal with this vast subject in detail; in any case there are several excellent reports available, with no lack of guidance as to what is needed. Also some important developments have taken place since I began this enquiry.

Training of the operative

52. In the civil engineering industry apprenticeship in its traditional form is regarded as not relevant to conditions of work. Even though firms are able to

offer some continuity of employment their work is often in remote areas and the work itself does not offer the variety which is desirable for a craft apprentice. The industry has, however, recognised the need for skilled training to meet its own requirements, and there are schemes of training, with differences in periods of training for different skills—as shown in the five-year training scheme for contractors' plant mechanics and the three-year scheme for maintenance mechanics. A system of "job training" is designed to enable men to advance to supervisory grades. I am assured that the civil engineering contracting industry is increasingly alive to the importance of the subject.

53. In the building industry a National Apprenticeship Scheme was inaugurated in 1945 and, until 1956, the Building Apprenticeship and Training Council, appointed by the Minister of Works, kept the arrangements under review and advised on matters of recruitment, education and training. The Council was representative of all sections of the building industry, the professional institutions and educational bodies. In their final report of July, 1956, they summed up the results of their work and gave an objective account of achievement and of problems still to be tackled by the industry. Some of the matters to which they drew attention still call for action, including the length of apprenticeship in the various crafts, the adjustments needed to take account of changes in educational opportunities in schools and technical colleges, the possibility of transferring apprentices from one firm to another so as to give a greater variety of experience, and the financing of the cost of training on a wider basis.

54. Developments in the technique of building operations—even since 1956—call for more radical measures, based on a reappraisal of conditions in the industry and of changes to come from prefabrication, new materials and mechanisation. Old craft skills are still needed while new skills have to be developed, so that the task of adjusting attitudes of mind and methods is formidable. It is, however, reassuring that the National Joint Council of the Building Industry has recently agreed to examine the whole system of apprenticeship and training and that a joint committee has begun its task. It will have to consider afresh the definitions of the crafts, the kind of skill to be acquired, the degree of competence to be reached and the length of period required for each operation. Should a youth be trained for one skill only, and is there a place for a skilled building technician competent to cope with modern techniques and new materials? Some processes no longer require a high degree of skill; others call for skilled training which is not always available. Leaders on both sides of the industry have already made suggestions for the reassessment of skills on a simplified basis and they should be given every encouragement.

55. In all this there is a need for more information about employment conditions in the industry, the reasons for the high proportion of non-indentured learners, the actual degrees of skill now needed in traditional crafts, the types of skill required as prefabrication and new materials develop, and the career prospects in changing conditions. The industry would be better equipped to review apprenticeship and training if objective information on these matters could be made available through a research project. The various Departments—the Ministries of Education, Labour and Works and D.S.I.R.—should be ready to give every possible help to the Joint Committee in its task.

56. A rationalisation of the apprenticeship system will do much to help in avoiding demarcation disputes, and no doubt in reorganising the trade union structure. The building industry has been remarkably receptive to the introduction of new techniques and new materials. There has been no opposition from the operatives to these changes, but disputes arise on the division of responsibility for new techniques between different crafts. A change in the apprenticeship system is bound to reduce the number of issues which cause controversy.

Conditions of Employment

57. The terms and conditions of employment in the construction industry are, of course, a vital element in the efficiency and productivity of an industry which employs a higher proportion of the male population of the nation than any other industry. Both the building and civil engineering industries are well served by joint machinery of long standing. There has been a noticeable absence of major industrial disputes, and labour problems have been settled without Government intervention on any major issue.

58. The National Joint Council for the Building Industry and the Civil Engineering Construction Conciliation Board have carried through several major reforms in the terms of employment. Such reforms include the scheme of holidays with pay, the provision of payment for time lost through inclement weather, and a guaranteed minimum weekly pay packet. In general, there has been a substantial lessening of the casual nature of the employment.

59. Nevertheless further progress can be made in improving conditions of employment in an industry where the place of work varies from job to job. In the case of civil engineering it is almost inevitable that a large proportion of the labour should be engaged locally. It has, however, become the practice of some of the larger firms to increase the size of their permanent labour force, though they still suffer from a turnover of labour which is probably greater than that of other industries. In the case of firms engaged in building operations conditions may vary from district to district and from firm to firm.

60. As high a proportion as possible of the operatives should be employed on a regular and continuous basis. This is not only a desirable objective in itself; it is also necessary if the status of the industry is to be raised in the public mind. The idea that employment in construction is casual must affect recruitment at all levels, from the apprentice up to management. In any approach to this problem one of the first essentials is to establish the facts. A great deal of information must be available, through the records of the Ministry of Labour and of the larger firms, which would show the extent to which operatives in the building industry, distinguishing between skilled and unskilled, change their employer in the course of a year. Also some study is needed of the effect on continuity of employment of the various systems of contracting. It is only on the basis of ascertained facts that a policy for increased stability of employment can be formulated.

61. Allied with the notion that the building industry is still a casual industry is the view that actual working conditions are less favourable than those in a factory. It is, of course, much more difficult, and in some respects impossible, for the industry to provide welfare conditions comparable with those of factory employment. This is a challenge to management, and many firms, large and small, have already faced up to the problem. What is needed is a concerted joint

effort to examine working conditions and to isolate for attack those which are in greatest contrast with factory employment. With present leadership in the industry development on these lines may be expected and in this connection regard will no doubt be paid to the policies outlined in the Ministry of Labour publications entitled "Positive Employment Policies" and "Security and Change".

62. The 1950 Working Party expressed the opinion that incentive payments are essential for increased output. At that time it was the intention of the parties to the joint agreement of October, 1947, to review the working of the agreement in conditions of full employment. It has not so far been possible to agree upon a permanent scheme of incentives and the organisations on both sides have not been able to regulate the many practices of extra payments adopted by individual firms in conditions of labour shortage. According to the Ministry of Labour only 14 per cent of wage earners in construction are paid under payment-by-results schemes, compared with 42 per cent in manufacturing industries. Here again more information is needed about actual conditions in the industry, the effect on production of incentive payments where they are appropriate, and the desirability of higher rewards for skill.

Supervisory Grades

63. The City and Guilds of London Institute now covers the whole field of technical education from craft to general foremanship studies. A great deal has been done by the National Federation of Building Trades Employers, through the National Advisory Committee for the Training of General Foremen, established in 1950, to encourage the expansion of the various courses for general foremen. Also the Federation, through its Building Advisory Service, organises courses for senior general foremen and special courses to meet the needs of individual firms. Local Associations of the Federation are providing on an increasing scale residential week-end courses for general foremen at various centres throughout the country. There is a great need in the building industry for good quality foremen and these activities deserve all possible encouragement.

Training for Building Management

64. The Board of Building Education, established jointly by the Institute of Builders and the N.F.B.T.E., has reviewed the whole field of education for the building industry. The subject of management training has been the subject of many reports, including a special study undertaken jointly by the British Institute of Management in collaboration with the Board of Building Education, under the chairmanship of Sir Hugh Beaver. Their report was published in 1956 but action still has to be taken on some of their recommendations. The subject was also dealt with in a report published in 1957 by a study group appointed by the London and Home Counties Regional Advisory Committee. I can only reinforce what was said in those reports, and in particular to emphasise the importance of site management.

65. If the efficiency of the industry in general is to be improved competent management must be spread more widely, and modern methods of training must be developed to cover the complexities of modern building technology, and human relations. Wider building education is particularly important for the medium and smaller sized firms, many of which are still family concerns. Under modern conditions it is not enough for the proprietor of a building firm

to rely on inherited talent for efficient management. Sooner or later he will be "taken over" but this may be a painful process. The importance of this question is recognised by the leaders in the industry but the medium and smaller firms must be made aware of the advantages which would accrue to them if they were to adopt modern methods of cost control, planning, programming, site management, and so on. It may be that the gradual development of the Building Advisory Service, coupled with the force of economic conditions, will bring them to a realisation of their own need. As a short term measure more high level training courses for management are needed.

66. One broad conclusion to be drawn from this brief survey of training is that the present leaders in the industry, are aware of the need for reform and are taking action. For the reasons already given, the building owner is vitally interested in the outcome and consideration needs to be given to ways of helping the various organisations. Since the Building Apprenticeship and Training Council made its final report in 1956 Government interest has been fitful, and there has been no body charged with the overall duty of keeping under review the arrangements for training at different levels and their progressive development. The Ministry of Labour is now in touch with the new Joint Committee on apprenticeship, and the Ministry of Education has an interest in proposals for other forms of training, but there is no clear line of responsibility. I suggest that in matters affecting training for management and higher education in the building industry—including supervisory staff and the responsible administrative and technical staff such as building surveyors, site managers, clerks of works and general foremen—the National Consultative Council of the Minister of Works, or a sub-committee, should consider the possibility of further joint action by Government Departments and the organisations concerned, particularly in promoting greater interest in the courses which are already available.

IX

Research

67. Research in the building industry is carried out mainly by the Building Research Station, under the Department of Scientific and Industrial Research, in collaboration with other research units of that Department, and with several industrial research associations. Many of the building materials industries carry out their own research. Only large contracting organisations can afford, or find it worthwhile, to engage directly in research, but a few of the largest and most progressive firms have research units and I have been privileged to visit some of their research laboratories. Naturally their work is primarily directed to their own interests and not to general problems, but some activities are undertaken on behalf of consulting engineers, architects and public authorities.

68. In civil engineering there is new interest in research. Both the Institution of Civil Engineers and the Federation of Civil Engineering Contractors have set up research bodies of their own to bring about more co-operation between the industry and the research stations. The National Federation of Building Trades Employers has a liaison committee with the Building Research Station. The suggestion has been made from time to time that the building industry

should take some collective responsibility for the cost and direction of building research but this was rejected by the Working Party in 1950, and cogent reasons for keeping to existing arrangements were given by the Building Research Board in 1958.

69. I have not attempted to examine the details of the building research programme of the Building Research Station, but taking a broad view over a period of years it is clear that by far the largest part of the research work has been directed to materials, the design and performance of structures, engineering services, and environmental conditions such as sound insulation and lighting.

Current expenditure amounts to about £744,000 in 1961–62 and is divided roughly as follows:

	per cent
Materials	20
Engineering and Soil Mechanics	20
Physical environment and engineering services in buildings	20
Information and allied services	20
User needs	5
Building operations and economics, including mechanisation	15

70. In the next few years the percentage allocated to user needs and building operations and economics will tend to rise, as more money becomes available, but there is little in the programme which is of interest to the practical builder or the operative, who are responsible for the handling and assembly of materials. The industry and the professions might take a closer interest in research if more could be done in such matters as site organisation, work study, cost control, conditions of employment, and human relations. This will mean more money and staff but there can be no doubt as to the value to be gained. The Building Research Station should be able, for example, to carry out investigations on behalf of the joint committee which is reviewing apprenticeship, and the proposed committee on contracts. There have been proposals for a research project to investigate the structure of the industry at the higher levels. Relations between those engaged in the building process are undergoing rapid change and the results of an enquiry which would last several years would not be of immediate practical value. Given the resources there is however no lack of urgent work to be done, in examining methods and organisation at different levels. Priorities can best be settled in consultation with organisations within the industry.

71. In 1950 the Ministry of Works set up a technical information service to encourage the application of new knowledge in building and the spread of good building practice. A good deal of extremely valuable work was done by a small staff in organising exhibitions, lectures, and films, and co-operating with technical colleges. The Ministry also issued advisory leaflets. Proposals have now been made jointly by the national organisations representing architects, surveyors and builders for a technical advisory service which will meet their various needs. This scheme calls for Government financial backing and general support and no time should be lost in taking decisions and launching the scheme.

72. Some reference must be made to the change in departmental responsibilities following the reorganisation of industrial research under the Act of 1956. At that time the Ministry of Works was responsible for reviewing the whole field of building research and for bringing to the notice of D.S.I.R. or other appropriate organisations problems requiring further research. The Ministry was charged also with the duty of encouraging the use of the results of research. It was considered at that time that in the selection of subjects for research the representatives of the industry should be brought fully into consultation and be given ready and effective means of making their own suggestions. The machinery for doing this was the Advisory Council on Building Research and Development which was first established in 1947.

73. The Ministry of Works no longer has any responsibility for research and the Advisory Council on Building Research and Development was disbanded in 1959. The Building Research Board which advises the Building Research Station on their programmes of work consists partly of scientists and partly of persons drawn from the professions and the industry. They serve in an individual capacity and not as representatives of organisations. In addition there are assessors appointed by Government Departments.

74. The Building Research Station hopes to bring the industry and the professions into closer association with its work by calling one day conferences at which there can be open discussion and views can be expressed on the Station's work. In the past three years only two such conferences have been held. No doubt they were of value, but it has yet to be shown that this arrangement is an effective substitute for the submission of carefully thought out proposals prepared by national organisations after consultation with their regional and local constituents.

X

The Public Interest in Increased Efficiency

75. Some of my recommendations rest on an assumption that the Government has a general interest in promoting increased efficiency in the construction industries. That interest has been shown in the past mainly through the work done at the tax-payer's expense by the Building Research Station. Many Government Departments are now concerned with building and civil engineering programmes, either directly as in the case of the Ministry of Works and the Service Departments, or indirectly as in the case of the Ministries of Education, Health, Housing and Transport, the Home Office, the University Grants Committee and so on. In addition, the nationalised industries and public bodies in which the tax-payer has a stake, have construction programmes. Nearly half the total capital investment programme of the country is now on public account and the greater part of this is in the hands of local authorities. With such a large range of interests it must fall to central Government to focus attention on general measures for increased efficiency for the benefit of the building owner in the public sector.

76. The Government also has an interest in the efficient working of the construction industries as part of the plans for economic growth. If with the

help of the new National Economic Development Council there is to be a programme of expansion there must be some assurance that the construction industries will be able to meet the demands likely to be put upon them.

77. There are thus good reasons for the view that both in the interests of building owners in the public sector, and because of its concern with economic growth, the Government needs to exercise a more positive influence on the general efficiency of the industry. This is not a question of imposing controls, but simply of creating a new relationship between Government Departments and the industries, and of trying to establish conditions in which all those engaged in construction can themselves increase their efficiency.

78. How can this be done? First of all there is a vast store of experience within the works directorates of Government Departments, particularly of those responsible for direct Government building. An arrangement has recently been made for the professional heads of these directorates and the Chief Architects of Departments responsible for large building programmes—houses, schools, hospitals—to meet together regularly to exchange experience and information on such matters as procedures, drawing office methods, new technical developments, costs and so on. This inter-Department group is still feeling its way, but if it takes a broad view of its functions its work will result in economies in Government building programmes, and it may be able to suggest ways in which efficiency can be improved in the programmes of local authorities and other public bodies.

79. More publicity might be given to the work of development groups in Government Departments. This has already been done by the Ministry of Education. There is no special magic in the techniques adopted by development groups, but the results of closer contacts at the design stage between the user and the professional team are impressive and the lessons need to be more widely known.

80. The system known as " CLASP " has resulted in substantial economies in school buildings. The economies result mainly from the opportunities for large scale buying of prefabricated components for a continuing programme, while allowing freedom for variation in design. There seems to be no reason why similar economies should not be gained by extending the method to other large programmes where conditions are suitable. A bold initiative is needed and that initiative cannot be left to manufacturers. It must come from central Government and local authorities.

81. Strong guidance should be given to local authorities and other public bodies on the procedures they should follow in carrying out their building programmes. Such guidance was given to the Universities by the University Grants Committee; similar guidance may well be needed by other public bodies with continuing programmes in the social services, e.g. hospitals.

82. These are a few suggestions as to ways in which central Government might extend its influence, largely by example and precept. They do not give rise to any serious problem of division of responsibility between different Departments though some co-ordination may be needed. There remains however a need for a focal point where those matters which are common to all forms of building can be brought under examination and discussed. A few examples will help to show the distinction.

83. All agree that economies and greater efficiency would result from the standardisation of materials for building. The Working Party of 1950 envisaged a separate organisation for the purpose of initiating standard specifications but this is hardly necessary. On the other hand it cannot be left to the manufacturer on whom so many varying demands are now made. A central driving force is needed to get things done.

84. Arguments have gone on for several years about a system of modular co-ordination, i.e. a standard unit of measurement for building components. If, as is claimed, such a system will lead to economies, it is surely time that a choice was made between the rival schemes. In this matter, as with standardisation of materials, the possible entry into the Common Market adds to the urgency.

85. Even with the Building Advisory Service of the N.F.B.T.E., and the proposed new technical advisory service to be established jointly by the architects, surveyors and builders, there remains a problem of injecting the results of research into the blood stream of all sections. The Building Research Station helps to disseminate the results of its work but some results call for more positive action than others. Some research adds to the sum of knowledge about building materials and special technical problems; other research should have an immediate impact on procedures, methods of construction, organisation, and costs. The former will be taken up by the special interests concerned and for others the information can be put in the reference library; the latter will be of immediate interest to the building owner and may have far-reaching implications.

86. For example, in their last published report (for 1960), the Building Research Board gave the results of a five-year research programme on the chemical resistance of concrete. The same report gave the results of work on the co-ordination of sizes of building products; the conclusion reached was that " if the industry could do no more than avoid the over-sizing of products there would be an immediate and general reduction of waste and increase of accuracy, quite apart from the advantages of introducing a system of preferences ". Both these items of research are important. It may be assumed that the former will be acted upon. Who is to see that the latter is carried through into practice in the interests of the building owner?

87. In addition to matters such as these, where central co-ordination and influence are needed to get things done, the industries and the professions should have a channel through which they can make their representations on matters which affect a number of programmes, or seek help on activities which are of interest to more than one Department. The Ministry of Works now provides such a channel, through the Minister's National Consultative Council, and through regular meetings with the Building Materials Producers Council and the Federation of Associations of Specialists and Sub-contractors.

88. It is of course possible that the proposed new council for the construction industries will be able to focus attention on some of these problems. The council will not however include any representation of the building owner, in the public or the private sector. The representative organisations in all sections are I believe ready to accept—and some would welcome—a closer relationship

with central Government in their efforts for more efficient working, and they will continue to look to the Ministry of Works, and to the Minister's National Consultative Council, the Advisory Committee of Specialists and Sub-contractors, and the Building Materials Producers Council, as a means of communication on Government policy and programmes. One result of my survey might well be a review of these arrangements, and an examination by the National Consultative Council of ways in which its usefulness could be extended and its authority enhanced.

XI

Summary of Conclusions and Recommendations

1. All sections of the construction industries need to have confidence in a steady expansion of the demands on their services, with continuity of work free from " stop and go ". The declarations of Government policy on economic growth, the formulation of public programmes for some years ahead, and the establishment of the National Economic Development Council will help to create this confidence.

2. The building materials industries, and the merchants and distributors, may be relied upon to meet an increasing demand for their products and services. More standardisation of materials and components is needed.

3. Efficiency in building operations depends on the quality of relationships between the building owner, the professions—architect, surveyor, engineer—and the contractors and sub-contractors. Ways must be found of improving co-ordination between them. The National Joint Consultative Committee should be asked to examine this problem urgently in collaboration with other professional associations and industrial organisations concerned.

4. The system of the placing and management of contracts should be reviewed comprehensively by a Government Committee with an independent Chairman. The co-operation of local authority associations should be secured in advance.

5. A small working party should report on the different systems and practices in operation in Scotland and on the possibility of unification.

6. In the long term a great deal will depend on the adequacy in numbers, quality and training of personnel, in all sections and at all levels. Government Departments should co-operate fully with the reviews now proceeding within the professions and the industry and where possible give practical help and encouragement in the extension and use of training facilities.

7. More research is needed into building economics and practical problems of interest to the architect, the contractor and the operative. The organisations concerned should be asked to advise on priorities.

8. Government support should be given to the establishment of a technical information service by the architects, surveyors and builders and no time should be lost in developing this service.

9. The Government has an interest in increased efficiency, partly as representing the building owner in the public sector, and partly because of its responsibility for promoting economic growth for the country as a whole. This calls for a new form of relationship between Government and the construction industries. The existing arrangements for consultation should be reviewed.

HAROLD EMMERSON.

22nd February 1962.

APPENDIX I

COPY OF LETTER ADDRESSED TO VARIOUS ORGANISATIONS BY LORD JOHN HOPE, MINISTER OF WORKS

25th August, 1961

Although the Chancellor has taken steps which will have the effect of restraining increases in the demands on the building and civil engineering industries, it seems clear that over the next ten years the demands on the industries will be heavy.

I am sure we should be considering what measures can be taken both by the Government and the industries to enable them to meet the foreseeable demands with the greatest efficiency. I have reached the conclusion that as a first step it would be helpful if an independent person could make a quick review of the problems before the industries, pick out those which are of first importance for greater productivity and suggest how they might be tackled.

I am glad to say that Sir Harold Emmerson has agreed to undertake this task. He would hope to produce a report for us to consider by the end of the year, though be may need a little longer. Sir Harold will welcome any views and suggestions which the various organisations and professional bodies or their members may care to offer. He will also wish to have personal conversations with some of the leaders in the industries and professions and he will get in touch with you direct on this matter.

I shall be grateful for all the assistance you can give me in this important task and I hope you will feel able to express your views as freely as possible.

APPENDIX II

LIST OF ORGANISATIONS CONSULTED

Government Departments

Department of Scientific and Industrial Research
Ministry of Education
Scottish Education Department
Ministry of Health
Department of Health for Scotland
Ministry of Housing and Local Government
Ministry of Labour
Ministry of Works
Treasury
War Office

Other Public Bodies

Central Electricity Generating Board
Iron and Steel Board

Professional Associations

Association of Consulting Engineers
Institution of Civil Engineers
Royal Incorporation of Architects in Scotland
Royal Institute of British Architects (R.I.B.A.)
Royal Institution of Chartered Surveyors (R.I.C.S.)

Industrial Organisations

Cement Makers' Federation
Civil Engineering Conciliation Board (Operatives' Side)
Contractors' Plant Association
Federation of Associations of Specialists and Sub-Contractors
Federation of Civil Engineering Contractors
London Master Builders' Association
National Council of Building Materials' Producers
National Federation of Builders' and Plumbers' Merchants
National Federation of Building Trades Employers
National Federation of Building Trades Operatives
National Federation of Clay Industries
Scottish National Building Trades Federation (Employers)

Overseas

Construction Industries Joint Conference—U.S.A.

APPENDIX III

DISTRIBUTION OF OPERATIVES AMONGST DIFFERENT TYPES OF WORK ACCORDING TO SIZE OF FIRM

Great Britain *Numbers*

Number of Operatives employed	New Work		Repair & Maintenance		All work	
	1949	1960	1949	1960	1949	1960
1–5	16,593	30,836	99,067	60,361	115,660	91,197
6–19	59,996	89,089	146,913	94,924	206,909	184,013
20–99	157,465	199,864	183,454	104,391	340,919	304,255
100–499	145,699	206,634	90,153	47,844	235,852	254,478
500–999	39,632	66,097	15,581	9,134	55,213	75,231
1,000–4,999 ..	71,999	103,536	19,979	13,212	91,978	116,748
5,000 and over ..	26,020	33,554	3,509	1,159	29,529	34,713
Total ..	517,404	729,610	558,656	331,025	1,076,060	1,060,635

Note.—About 30 per cent of the operatives are employed by general builders, 33 per cent by building and civil engineering contractors, 30 per cent by specialists and sub-contractors, and 7 per cent by civil engineering contractors.

APPENDIX IV

PERCENTAGE DISTRIBUTION OF OPERATIVES AMONGST FIRMS OF VARIOUS SIZES

Great Britain *Per Cent*

Number of Operatives Employed	Craftsmen		Other Occupations		Total	
	1949	1960	1949	1960	1949	1960
1–5	13·6	11·0	5·8	3·9	10·8	8·3
6–19	23·3	20·9	12·1	10·0	19·2	16·7
20–99	34·0	30·4	27·7	24·2	31·7	28·1
100–499	19·2	21·5	26·7	28·6	21·9	24·2
500–999	3·7	5·5	7·7	9·7	5·1	7·1
1,000–4,999 ..	5·1	9·1	14·5	18·2	8·6	12·6
5,000 and over ..	1·1	1·6	5·5	5·4	2·7	3·0
Total ..	100·0	100·0	100·0	100·0	100·0	100·0

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